APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,639	08/18/2003	Farrokh Abrishamkar	020611	4435

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EXAMINER
MEHRA, INDER P

Qualcomm Incorporated
Patents Department
5775 Morehouse Drive
San Diego, CA 92121-1714

ART UNIT	PAPER NUMBER
2666	

DATE MAILED: 01/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO 90C (Rev 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/643,639	ABRISHAMKAR ET AL.
	Examiner	Art Unit
	Inder P Mehra	2666

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2003*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18 and 20-22* is/are rejected.

7)☒ Claim(s) *8 and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

    1.☐ Certified copies of the priority documents have been received.

    2.☐ Certified copies of the priority documents have been received in Application No. _____.

    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *10/18/04*.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____ .

DETAILED ACTION

1.   This office action is in response to application filed on 8/18/03. Claims 1-22 are pending.

Claim Rejections - 35 USC § 102

2.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3.   Claims 1-2, 11-14 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by

Parvathanathan, Subahmanya et al (WO03/015364), hereinafter, '364.

For claims 1, 12 and 22, '364 discloses, in reference to fig. 1, in a wireless communication system a method for estimating an original pilot signal, the method comprising:

- receiving a CDMA signal,(refer to paragraph 1002, At the receiver unit, a rake receiver is often used to recover the transmitted pilot, signaling, and traffic data, refer to paragraph 1004).

- despreading the CDMA signal, (refer to paragraph 1020, transmitter send signal which is spread with known scrambling code, which has to be despreaded at receiver, refer to paragraph 1003)

- obtaining a pilot signal from the CDMA signal, refer to paragraph 1003; and

- estimating an original pilot signal using a pilot estimator that includes more than one

filter (*(1063) FIG. 4A is a diagram of an embodiment of a pilot filter 236b, which is capable of implementing the second adaptive pilot filtering scheme* and that includes a switching method (selector, fig. 4A) for using the more than one filter (provide pilot symbols, and to *filter the pilot symbols* in an *'adaptive" manner (switching, selecting filters, fig. 4A)* to provide an improved estimate of the response of the communication channel via which the signal was received, refer to paragraph 1007), wherein the switching method uses a prediction error (refer to paragraph 1010), and wherein the pilot estimator provides a pilot estimate (The pilot may be used at the receiver unit for synchronization with the timing and frequency of the transmitter unit, *estimation* of the quality of the communication channel, ---------determination of the specific transmitter unit having *the best link to the receiver unit and the highest data rate supportable by this transmitter unit.*, refer to paragraph 1003),((1006) provide an improved *estimate* of the time-varying response of a communication channel from a received pilot in a wireless communication system.) .

For claim 11, '364 discloses, "wherein the method is implemented in a mobile station", refer to Paragraph 1003 lines 1-2 (terminal), and fig. 1.

For claims 2 and 13, '364 discloses, "wherein the pilot estimator includes a first Kalman filter and a second Kalman filter (Examples of adaptive filters include least mean square (LMS) filter, recursive least square (RLS) filter, Kalman filter, and so on, *filter the pilot symbols* in an *'adaptive" manner (switching)* to provide an improved estimate of the response of

the communication channel via which the signal was received, refer to paragraph 1007,

estimator 434 may implement a filter of any type and order, as is known in the art, refer to

paragraph 1066).

For claims 3 and 14, '364 discloses, "wherein the Kalman tilters are implementing

Infinite Impulse Response filters", (Adaptive and non-adaptive filters may be implemented using

an infinite impulse response (IIR) filter, (1064) Each filter 412 may be implemented as a FIR

filter, *an IIR filter*, or some other filter structure, and is further associated with a respective

response. Adaptive filters can track changes in the wireless channel based on statistics derived

from the filter inputs, refer to abstract).

. *Claim Rejections - 35 USC § 103*

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

5.   Claims 4-7 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Parvathanathan, Subahmanya et al, hereinafter, '364, as above, and further, in view of **K.**

Sam Shanmugan (XP-002254352, Channel Estimation for 3G Wideband CDMA Systems

Using the Kalman Filtering Algorithm), hereinafter, Sam.

'364 discloses all the limitations of the subject matter, including the following

limitations:

- wherein the first------filter provides a first filtered estimate and a first prediction error, and wherein the second-----filter provides a second filtered estimate and a second prediction error (paragraph 1064), **as in claims 4 and 15,** refer to fig. 4A and paragraphs 1063-1070.

- wherein the switching method uses the first prediction error and the second prediction error, **as in claims 5 and 16,** refer to paragraph 1053 .

- . wherein the switching method uses a first error Variance and a Second error Variance, **as in claims 6 and 17,** (the pilot symbols are initially filtered using a bank of two or more filters having different responses (or bandwidths). *Prediction errors are then computed for each filter, and the filter that minimizes the prediction errors is selected for use, refer to paragraph 1053.*

- wherein the pilot estimate, **as in claims 7 and 18,** is obtained according to the following: S sub k.MSE = a sub 1 S sub k (0)+ a sub 2 S sub k (0 sub 2)

where

S sub k.MSE is the pilot estimate,

------------------is the second filtered estimate,(refer to Eq (6) in paragraph 1050 and Eq

(7) in paragraph 1053).

with the exception of the following limitations, (however, '364 discloses, "Examples of adaptive filters which include least mean square (LMS) filter, recursive least square (RLS) filter, Kalman filter, and so on, *filter the pilot symbols* in an *'adaptive" manner (switching)* to provide an improved estimate of the response of the communication channel via which the signal was

received, refer to paragraph 1007, *estimator 434 may implement a filter of any type and order, as is known in the art, refer to paragraph 1066):*

- Kalman filter, as recited by claims 4 and 15;

Sam discloses Kalman filter, (Channel estimates and system performance can be improved by using either an interpolation scheme or a Kalman filter based on a random process model for the fading in the communication channel, refer to Introduction and paragraph entitled "2. IMPROVED ESTIMATION PROCEDURE", and abstract.

It would have been obvious to a person of ordinary skill in the art to combine the capability of using KALMAN Filter. This capability can be combined in pilot estimator at Mobile station. The suggestion or motivation to do so would be to provide accurate estimation of underlying channel characteristics.

6.   Claims 9-10 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Parvathanathan, Subahmanya et al,** hereinafter, '364, as above, and further, in view of **Massicotte et al** (US 2004/0136444), hereinafter, '444.

For claims 9-10 and 20-21, '364 discloses all the limitations of subject matter, as above, with the exception of the following limitation, which are disclosed by '444:

- wherein the switching method comprises a soft- switching method (or for an MMSE estimate, specification page 14, paragraph 1060), (Other algorithms proposed are the ZF (Zero Forcing) algorithm and the <u>MMSE</u> (Minimum Mean Square Error)

algorithm which require the exact impulse response of all the users channels, refer to
paragraph 0026 on page 2);

- wherein the switching method comprises a hard- switching method (or MAP-
  estimate, refer to specification, page 14, paragraph 1061), refer to "the Maximum a-
  posteriori (MAP) algorithm", page 2 paragraph 0025 for symbol-by-symbol
  detection.

It would have been obvious to a person of ordinary skill in the art to combine the
capability of using hard and soft switching methods, as disclosed by '444.. This capability can be
combined in pilot estimator at Mobile station. The suggestion or motivation to do so would be to
provide accurate estimation of underlying channel characteristics.

Allowable Subject Matter

7.   Claims 8 and 19 are objected to as being dependent upon a rejected base claim, but would
be allowable if rewritten in independent form including all of the limitations of the base claim
and any intervening claims.

Prior Art of Record

8.   The prior art made of record and not relied upon is considered pertinent to applicant's
disclosure.

- Subrahmanya et al (US 2003/0072277) discloses techniques to filter pilot symbols for
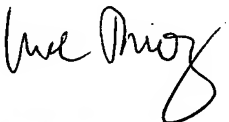 a pilot in adaptive manner.

Conclusion

9.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Inder P Mehra whose telephone number is 571-272-3170. The examiner can normally be reached on Monday through Friday from 8AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Inder Pal Mehra 12/23/04

Inder P Mehra

Examiner

Art Unit 2666

FRANK DUONG
PRIMARY EXAMINER